the Mecheleciv

VOL. 12 DECEMBER 1952 NO. 3

THE SCHOOL OF ENGINEERING
GEORGE WASHINGTON UNIVERSITY

the Mecheleciv

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IN THIS ISSUE

ENGINEERING SCHOOL CALENDAR

December 15—Christmas Tree Lighting Ceremany, sponsored by the Engineers' Council, Lisner Terrace, 5 P.M.
December 17—Engineers' Council, Building N, 8:15 P.M.
December 22—Jan. 3—Merry Christmas and Happy New Year.
January 7—Engineering Societies, Monroe Hall, 8:15 P.M.
January 14—Theta Tau, Monrae Hall, 8:30 P.M.
January 19—27—FINALS
February 4—Engineering Societies, Monrae Hall, 8:15 P.M.
February 11—Theta Tau, Monroe Hall, 8:30 P.M.
February 18—Career Conference, Lisner Auditiorium, 8:00 P.M.
February 21—Engineers' Ball, 9:00 P.M.
February 25—Engineers' Council, Building N, 8:15 P.M.
March 4—Engineering Societies, Monrae Hall, 8:15 P.M.
March 11—Theta Tau, Monroe Hall, 8:30 P.M.
March 18—Sigma Tau, Monrae Hall, 8:30 P.M.

ON OUR COVER . . .

Concrete arch, 498 feet in length, constructed by means of flying framework-cable hung forms in Venezuela.

—Photo courtesy of McGraw-Hill

FRONTISPIECE . . .

The multiple antennae atop the Empire State Building serving five VHF television stations and three FM transmitters, which can broadcast simultaneously.

—Photo courtesy of RCA

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It Is Resolved . . .

The New Year 1953 will soon be upon us. It is, therefore, proper, at this time, to review our past endeavors and actions and contemplate the necessary changes that will insure improvement and progress in the forthcoming year. Accordingly, the following resolutions are submitted for the consideration of all concerned.

It is resolved that we (the students) expend all efforts within our capabilties to improve the spirit of the school of engineering by joining, and taking an active interest in our respective societies and lending a hand or attending the functions planned for us.

It is further resolved that we rehabilitate the Engineers Club by painting, repairing and refurnishing the building (ASCE, THETA TAU, SIGMA TAU), repairing the electrical system (AIEE), repairing the heating system and other mechanical devices (ASME) and performing any other work necessary to convert this building into a homey, useable, engineering student center as soon as possible. It is further resolved that we arrange to build, repair or otherwise provide a radio, television set, record player or any other similar device that will add to the comfort and entertainment of our fellow students and club members (IRE).

In addition to the above we (the students) shall endeavor to help and befriend one another and work together as one to make this school of engineering more than just the place we earned our degree, a place we can look back to, with fond, pleasant memories and with loyalty unsurpassed. This we resolve.

Magnetic Memory

Charles R. Laughlin, BEE '53

Many of the practical problems of science, business, and warfare are essentially computational. Hypothetical treatment of large quantities of data afford a sound basis for logistical and business decisions. A great deal of time is required for human manipulation of such extensive calculations. For this reason, continued research and development has been conducted to find fast and accurate means of handling such numerical computations.

A desk calculator can perform such operations, but the operator must intervene after every computation to issue a new command of operation for the machine to follow. This encumbers the machine and makes the handling of large computations intolerably long. For example, during a second of time such a machine is capable of carrying out 1000 multiplications, but the operator is capable of issuing at most a single command. An automatic sequence could be built into such a calculator, but this would limit the machine to one set pattern of operation.

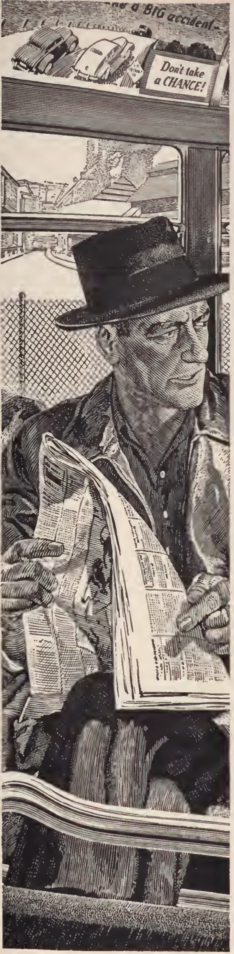
Computation of any sort involves writing or storage of the original data of the problem, storage of carry-overs in the mathematical process, storage of intermediate results, and storage of the final solution. From this it is apparent that a computor to be fast, automatic and versatile must have a memory which is capable of storing data and information in such a manner as to have it available nearly instantaneously. Complicated calculations performed in small increments demand a voluminous storage outside the arithmetic units to store the partial results until they may be pieced together into a final solution. The machine then must possess a memory in addition to an arithmetic element and a control element.

Magnetic recording is a technique widely used to fulfill the above needs because of its versatility and quick access time. Magnetic storage offers a means for both internal storage and input-output functions. A simple magnetic memory consists of a continuously rotating drum coated with a suitable metallic oxide. The information to be recorded is translated into electrical pulses which are passed through electromagnetic recording heads placed in banks in close proximity to the rotating drum. Each succeeding element of the drum is brought into a definite magnetized state in which it tends to remain upon leaving the recording field. The resulting permanent pattern on the surface of the drum is related to the time variation of the signal. This pattern will be read by the reproducing head when the drum surface passes under this head.

Each such binary digit to be stored requires a separate track around the periphery of the drum, the standard spacing being 8 tracks per inch. A nine digit decimal number in the binary system requires 74 tracks, and therefore the drum must be at least 10 inches wide. As many as 80 digits per inch may be stored in each track so that a drum of 34 inches in diameter and 10 inches long is capable of storing more than sixteen thousand numbers of thirty binary digits each and the access time will not exceed 64 milliseconds, and usually much less.

It is obvious that such close packing of information requires elaborate electronic circuitry to record and read information at precise positions of the drum when the peripheral speed may be as much as 1600 inches per second. Basically, this is done by counting circuits which count the storage positions as they go by. When the correct storage box is under the reading heads the counter enables these heads to read only the information at that position.

In spite of this elaborate timing device, the magnetic drum is the most versatile and economic at this time. Because of the word density possible only about 1.3 tubes per 1000 digits are required. Also, power failure does not mean loss of information though information may be erased and rewritten at any time. The salient disadvantage is the relatively slow access time as compared to some other systems.



"Look what *I'm* reading!

"No kidding, Ed . . . the EDITORIAL *page!*

"You know me, Ed...I'm strictly a sports page guy. But when I was home in bed last week with that blasted head cold, I didn't have much to do but read the paper.

"So, with time to burn, I looked at everything but the recipes . . . which is Marge's department, anyways. And, Ed, what I read in those editorials made me mad enough to forget I felt punk.

"One was about *'Creeping Socialism'*. It told what's going on right under our noses . . . a lot of undercover work to turn us into a bunch of spineless dummies, instead of free citizens.

"It warned how we *could* lose some or all of our Freedoms . . . you know, free speech, press, vote and religion. *And* the right to work or live where we please. This editorial showed how other people abroad have let socialism, then communism, take over and make slaves out of them. And all the time these people thought all they had to do was let Government *'take care of them'*. And it sure did!

"Since then, Ed, I've been reading *all* the editorials and articles . . . in newspapers *and* magazines. Been learning to think, too. And to talk things over with my neighbors and the fellows we work with down at Republic . . . things like government ownership and wasteful spending that can bankrupt a whole nation and all its citizens. Yep, I've been learning to appreciate the Freedoms that *we* have and other people *don't*. And best of all, yesterday I REGISTERED TO VOTE. . . *and my wife did, too!* That's the BIGGEST American Freedom of 'em all, and like a dope I've been too careless to protect my own and my family's interests with a ballot!

"Funny, isn't it? From a cold in the head, I got sense in the head."

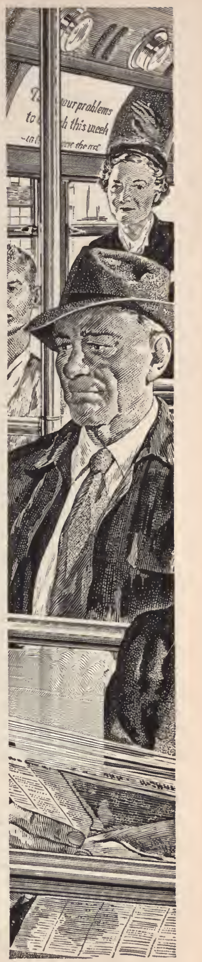
REPUBLIC STEEL

Republic Building • Cleveland 1, Ohio

Republic BECAME strong in a strong and free America. Republic can REMAIN strong only in an America that remains strong and free... an America whose stores are laden with the many fine products of a free Textile Industry. *And, through Textiles, Republic serves America.* Long-wearing, comfortable dress and suit materials . . . gay prints . . . smart drapery and upholstery fabrics . . . all are spun, dyed and woven on machinery made of carbon, alloy and stainless steels . . . much of them from the mills of Republic. New, almost magical synthetic fibers are today developed and produced with equipment largely made of stainless steels, notably Republic's famed ENDURO. Thus steel does its part to help keep Americans comfortably and smartly clothed the year round.

* * *

For a full color reprint of this advertisement, write Dept. H, Republic Steel, Cleveland 1, Ohio.



Lest We Forget

Arthur G. Albertson, BCE '51

In these days of atomic energy, jet airplanes and other momentous developments, most of us never stop to think that the little things in life are what we should appreciate the most. Have you ever stopped to think what life would be like without the match or needle or, for your wife's sake, the vacuum cleaner? As for myself, there are times when I would gladly trade a thousand atomic energy reactor piles for just one good toothpick. Now, I don't want to discuss the great inventions that we all know the history of such as the steamboat, electric lights and many others, but I would like to bring back into the limelight a few of the inventions that we nowadays just take for granted.

First, we will consider what I would call the backbone of the stove, the match. Of course, we must associate fire with the match and we all know about the early crude ways of starting fires. By this, I mean the rubbing of sticks together or the use of flint and iron ore and other methods. What we are concerned with is what is called the chemical match. About 300 years ago, a man in Vienna accidentally dropped some sulphuric acid into a mixture of chlorate of potash and sugar. A bright flame was produced and we have the beginning of the modern chemical safety match. From this accident, a fire producing kit was put on the market. (I use the word 'market' loosely for 300 years ago.) This kit consisted of a bottle of sulphuric acid, a bundle of sticks with sulfur tips, a quantity of chlorate of potash and some sugar. You can imagine what it looked like when a man lit his pipe. Only the higher class of people could afford these matches since they cost approximately $5.00 per hundred. Not only were they expensive, but they would usually sputter and blow out or one would get acid splashed on his clothes. So some changes had to be made, and in 1827, a man named John Walker got the bright idea to put some sulfur, chlorate of potash, and sulphide of antimony all together on the head of a stick. Then he rubbed this stick on sandpaper and it burst into flame. Thus was produced the first friction-chemical match. However, this match was likely to burst into flame at the slightest amount of friction so some method had to be devised to improve their safety. This was accomplished by substituting a mixture of phosphorus and sand for the antimony and applying it on the outside of the box. This is essentially the safety match we use today.

Should you ever doubt the importance of this invention to our society, it would be well to note that over 150 billion matches are sold in the United States every year.

Next, we shall look into the little gadget which saves every housewife many hours of work. David E. Kenney, a New Jersey plumber, is considered the father of the mechanical vacuum cleaner, but an Englishman named Herbert Booth got the idea at about the same time Kenney did. The old method was to blow the dust out of rugs, but Booth got the idea one day to use a vacuum to draw the dust out of rugs. This notion came to him one day while he was sitting in a restaurant, so he placed his open mouth against the upholstery of his chair and sucked in. As you might guess, he choked, but this brought him to realize that his brainstorm had possibilities.

The first working vacuum cleaner, however, was built in 1902 by Kenney, the American. Housewives did not rush madly to the store to buy one though, because the first vacuum cleaner weighed 4,000 pounds and cost $2,100. It was installed in the basement of Pittsburgh's Frick Building and had a steam-driven vacuum pump with a pipe outlet on every floor.

Thus a start was made on the modern vacuum cleaner. By 1905, a vacuum cleaner weighing only 50 pounds was put on the market. There is no way to measure just how much the housewives are indebted to Mr. Kenney and Mr. Booth.

The automobile, which we could almost call a necessity in these times, need not be pushed further into the limelight, but here again, we are forgetting how we came by the automobile. Very few of us ever appreciate how much the operation of an automobile depends upon the rubber tires. Isn't it startling to realize that 60 years ago there was not one pneumatic tire on the market, not even for bicycles. At that time, however, Charles Goodyear did have solid rubber tires for bicycles.

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LEST WE FORGET *(Continued from page 10)*

The streets in Belfast, Ireland, in the year 1884, were paved with what we call Belgian blocks, which do not provide a very smooth surface for solid-tired bicycles. Every day the children would complain to their fathers how rough it was on their tricycles, so one of these fathers, Dr. John Dunlop, a veterinarian, decided to do something about it. He made a wooden disc wheel, and around the edge of it he fastened an inflated rubber tube which was held in place by a linen cloth tacked to the wheel. He took the old hard rubber tire and this new concoction of his and rolled them both across the yard. The new one rolled clear across the yard and bounced off a wall on the other side, while the hard rubber tire did not go nearly as far. From then on, his son would have nothing but these new air tubes on his tricycles simply because he could beat the older kids at racing. At this time, Dunlop conceived his new idea as being merely a new toy for his son.

From here, the development of the pneumatic tire progressed very rapidly. The professional bicycle racers of those days first tried it and the tire proved to be a big success. Next, it was used on the automobile, and, to make a long story short, this would be a mighty bumpy world had it not been for Dr. John Dunlop.

It seems like every way you turn today, somebody is either working with plastics, buying some plastic item or talking about plastics. If the people of 80 years ago had not loved to play billiards, we might not have had this new field of plastics today. In those days, all billiard balls were made of ivory, but there was a terrible shortage of ivory, so one of the leading manufacturers offered ten thousand dollars to any person who could develop an acceptable substitute. John Wesley Hyatt of Albany, New York, who was a young printer and inventor, accepted the challenge and set to work. For three years, in his spare time at night and on Sundays, he tried making billiard balls out of wood, paper, glue, and just about anything he could think of.

One day, while setting type, he cut his finger and stepped to the medicine cabinet for some liquid court plaster or collodion. But someone had spilled the bottle and its contents had formed a very hard sheet. Hyatt immediately thought this might be just the thing he was looking for. He checked into what this collodion was and found that it contained nitrocellulose or guncotton.

Continuing his experiment, he found a way to make guncotton from alcohol and camphor. He combined these by using heat and pressure and the result marked the beginning of what is now known as 'Celluloid.' Other than vulcanized rubber, this was the first member of the present family of plastics, from which resulted the great industries of photography, motion pictures, and many others.

In closing, I would like to quote a statement by C. F. Kettering, who is the Vice President of General Motors and Directing Head of the General Motors Research Laboratories—"Opportunities are almost completely controlled by the determination of the man—and not by his surroundings or the things with which he has to work."

Bio-Engineering

H. G. Chandler, BEE '53

The term bio-engineer is a relatively new word and a relatively new concept. It has been only recently that the idea of applying engineering techniques and engineering know-how to the field of medical research has become accepted. The engineer has been slow to appreciate that here was a completely alien field that needed his abilities; and the medical researchers have been reluctant to try to communicate their needs to some one so completely unknowledgable in the medical sciences.

Yet, after all, are these two great professions so unrelated? The engineer designs and builds things that will work. The medical researcher knows what he wants to build, but not how to go about it. Who can do the job for him? An engineer, of course.

The medical profession has already called upon the chemist and physicist to aid in their fight against disease and infirmity. Now they are beginning to call upon the engineering skills. In return, it behooves us who are interested in this phase of engineering to become as conversant as possible in the biological sciences.

One problem the good doctors are involved with today is building a pump and filter system to temporarily replace the heart and kidneys. Here is a natural for an engineer. Another is the ballistocardiograph—an effort to analyze the action of the heart by measuring the reaction of the body to its surge with each beat. One of the problems associated with old age is the loss of elasticity of the walls of the arteries. One way to measure the "goodness" of these arterial walls is by determining how well and how fast they will transmit an impulse.

There are many other problems in the realm of the bio-sciences where an engineer may test his mettle, and earn the satisfaction of having contributed something of value to mankind when he folds his compass, and closes his slide rule for the last time.

Non-Broadcasting Applications of Television

Howard Wilson, BEE '53

All of us are familiar with television as a medium of entertainment. Hundreds of programs daily beam sound and pictures from all over the world into our homes as they happen. Not very many generations ago this wonder of the modern world was inconceivable, yet today it is the most commonplace form of entertainment. Paralleling and perhaps more remarkable than the broadcasting of programs have been some of the other applications to which television has been put.

A significant contribution has been made in the medical field in the training of surgeons. Although the broadcasting industry cannot broadcast in color at the present time and is not prepared to send us three-dimensional pictures, these techniques have been used to enable doctors and medical students to watch master surgeons at work. Consider an observer sitting in a conventional hospital amphitheater adjoining the operating room. He is seated at some distance from the patient and his view of the operation is often blocked by nurses, assistants and the surgeon himself. Compare his view with that of another more fortunate observer, seated comfortably before a large television screen with a superior view. The camera, unlike the observer, can be mounted directly above the patient so that operating room personnel do not pass between it and the patient. The use of a good color system will make the picture appear in nearly natural color, and variability of focus allows a flexibility in the closeness of view that the amphitheater viewer does not have. In addition, three-dimensional video photography makes perception of depth in the picture possible so that the observer may easily follow the intricate maneuvers of the surgeon.

Courtesy RCA
Compact table model electron microscope for use in colleges, hospitals and industrial laboratories.

Tri-dimensional television is not as widely known as the several color systems because there have been no great publicity campaigns or sensational legal battles to focus attention on it. Due to the displacement of the eyes by about three inches, each eye sees any scene from a slightly different angle. At large distances this is of no importance, but it gives us our psychological cues to the three-dimensionality, or space distribution, of what we see nearby. In the case of televising surgery it is important for the observer to have as accurately detailed a view as possible. To give the tri-dimensional effect the television pickup unit is provided with two camera tubes, which must be small enough in diameter to be spaced center to center by about the same distance as human eyes. The vidicon, which is a miniature camera tube of the image orthicon type, may be used. Each tube sees what would be seen by a human eye positioned at the same place. The image signals are carried from each camera to the receiver along separate lines or separate frequency channels. At the receiver the signals are routed to separate kinescopes. The light coming off each kinescope is polarized, one being polarized horizontally with respect to the picture, the other being polarized vertically with respect to the picture. An elaborate optical system superimposes the two pictures, still cross-polarized. The viewer looks at the receiver through eyeglasses, with each lens polarized to admit only the light intended for that eye. The apparent effect to the observer is a single three-dimensional scene.

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Low Temperature Refrigerants

H. B. Bauer, BME '51

Soon after our defense program got under way the manufacturers were called upon to make repeated studies of conditions occurring below-60°F. Although the market showed no prospects for volume sales, the projects were extremely important and the engineering departments of the various manufacturing concerns started on a program to meet this demand.

Oxygen had been liquified and ultra low temperature obtained but the project was to try and reach these low temperatures cheaply and more efficiently.

By 1941, evaporator temperatures of —70°F. were obtained using Freon-12. For lower temperatures the compression was broken into two stages so that each stage was operating at fairly high efficiency.

Great advances have been made as a result of the research conducted during the war and the development of new refrigerants. Freon-13 and Freon-14 are two of the most recently developed refrigerants belonging to the Freon family.

Freon-13 is monochlorotrifluoromethane ($CCLF_3$) having a boiling point of —114.5°F. at atmospheric pressure. Freon-14, or tetrafluoromethane (CF_4), has a boiling point of —198.2°F. at atmospheric pressure. By examination of their boiling points we can indicate the regions of most economical use; for example, with Freon-13 our evaporator under atmospheric pressure can reach a temperature of —114.5°F. On the other hand our condenser with a water temperature of 80°F. would be at a pressure of 535 psia. With these conditions it would be better to use this refrigerant in the first stage of a two-stage cascade system with another higher boiling refrigerant in the second stage.

Thermal stability studies of Freon-14 shows that it is the most stable of all Freons with no decomposition at 400°C. (752°F.) over a 500 hour period. Freon-14, unlike the other members of the Freon family, contains no chlorine and due to this characteristic exhibits specific solvent action on a limited number of compounds. With the proper conditions each of these solvent actions can be advantageous.

The Freon molecule is generally an excellent solvent for mineral oil fractions with the exception of Freon-13 and Freon-14 which are almost completely fluorinated. In selecting a refrigerant this property is important since the entire design of the refrigeration system depends upon solubility or lack of it.

Freon-13 and Freon-14 are expected to replace Freon-22 which is used as a refrigerant in industrial and commercial low temperature refrigerating systems to —150°F. employing reciprocating type compressors; and in many other uses, some of which are—

1—Calibration of temperature measuring devices.

2—Accelerated aging of steel for the production of precision tools and gauges.

3—Cooling of metal bushings or shafts for shrink fits.

4—Cooling and storage of aluminum rivets, spars and sheets to prevent aging before fabrication.

5—Hardening of pitch to make it brittle and easily removable from lenses.

6—Testing of airplane engines, instruments, radio sending and receiving sets, radar equipment, calibration of instruments and measuring devices, hydraulic equipment and accessories.

7—Cooling of oil or other coolant in high-speed machining and cutting operations.

8—Cooling of brine circulated to welding tips.

9—Low temperatures for the production and storage of penicillin and blood serum.

10—Low temperatures for the storage of blood for plasma, production of blood plasma and storage of blood plasma.

11—Low temperature chamber designed to duplicate stratospheric conditions for the testing of instruments, flying clothes, personnel, equipment and construction of operating materials.

In designing a system using Freon-13 or Freon-14 the pressure that prevails when the system is inoperative must be considered. At normal tem-

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ENGINEERING PERSONALITIES

JIM ROBINS

There is a new face among the faculty of the Civil Engineering Department. Some of you may mistake him for an undergraduate, which he was as late as 1950. This new instructor is Jim Robins, who has returned from Yale University with a Masters Degree in Civil Engineering.

Jim was born on May 6, 1928, in Fremont, Nebraska, where he obtained his pre-college education. He attended George Washington University for his undergraduate work, emerging in 1950 with the degree of Bachelor of Civil Engineering. Jim studied under Hardy Cross (H.X.) at Yale and in 1951 received his Masters. This pattern is familiar, since it is the same procedure followed by another member of the C.E. faculty, Dr. Miklofsky.

Following his graduation from Yale University, Jim married Eleanor Virginia (Klein) Robins, and settled down at 400 N. George Mason Dr., Arlington, Virginia. At present he is employed as a Structural Engineer at the David Taylor Model Basin and teaches C.E. 141 and C.E. 25 in the evening.

While at George Washington, Jim became a member of the American Society of Civil Engineers, Theta Tau and Sigma Tau Fraternities.

For five consecutive summers, while attending college, Jim worked for the U. S. Coast and Geodetic Survey in various parts of the country. In 1946 he was stationed aboard the converted yacht "Courie" on the Eastern shore of Maryland. The following summer, Jim was sent to Pend Orielle (Ponda-Ray), Idaho, doing hydrographic work. In 1948 the location was Lake Roosevelt, Washington. 1949 and 1950 saw Jim doing airport obstruction surveys throughout southern Utah, Wyoming, Colorado, Kansas, Nebraska, South Dakota, Minnesota, and North Dakota.

HSIN WONG

Certainly no list of engineering personalities at GWU would be complete without including Hsin Wong. Hsin was born in Hong Kong, China on May 2, 1928 and spent most of his boyhood there. His father was a middle class merchant dealing in medicine, which consisted mainly of herbs, roots, etc. Hsin attended grammar school and the Junior High School in Hong Kong until December, 1940 when it was occupied by the Japanese. In Junior High School Hsin took English reading for five hours every week for two years. He then went to Toyshan, Kwongtung which was the home of his ancestors and continued high school until 1942 when the Japs occupied that city also and closed the schools.

Then began a period of what Hsin considers the most difficult years of his life. At the age of 15 he would walk fifteen miles a day to buy ten pounds of potatoes; he would then resell the potatoes a pound at a time to make a small profit which he gave to his family. He also worked at farming. The crops raised were sweet potatoes and rice; this was difficult because of the lack of any mechanical equipment.

After the war was over his family returned to Hong Kong where his father reopened his old business. Hsin returned to his education and in 1946 graduated from Kwongtung Provincial First High School.

The universities in China were quite crowded and there was no chance of getting into college in the near future. However, with the help of an uncle who was a civil engineering student at NYU, he was accepted at Lincoln University and in 1948 he landed in San Francisco with $2000 to help him start upon his college career. The same year he transferred to George Washington University. During his first year at GWU he was enrolled in the University Student Division where he only took three courses a semester because of difficulty in speaking English. In 1949 Hsin began his career in the School of Engineering and has been at it ever since, striving for a degree in Electrical Engineering with a power option. He has belonged to the AIEE since 1951 and has been a

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• At the December meeting of the G.W.U. Branch of the ASME, Mr. R. R. Rinehart of Standard Oil of New Jersey discussed "Petroleum is Industry." Mr. Rinehart first discussed the history of the petroleum industry, including world output from 1920 to date. He described the structure of the large oil companies, stating that there are no oil monopolies. Mr. Rinehart at the end of his talk presented a very interesting film entitled "A New Concept in the Lubrication of High Compression Engines."

Virgil Pence and Harold Boyd, vice-president and secretary of the G.W.U. Branch, attended the ASME National Convention in New York City December 3rd and 4th. At the convention they attended the power show, the special awards dinner and heard Charles F. Kettering advise engineers on educational growth. They also had the opportunity to meet such eminent engineers as Dr. Timoshenko and Mr. Blacknall, the newly elected ASME president.

The next meeting of the G.W.U. Chapter will be held January 7, 1953, speaker and subject to be announced.

• The meeting of Theta Tau Fraternity on December 10 featured the taking of the Cherry Tree picture. Dan Andrich, the delegate to the National Convention, December 28-29-30, at Purdue University, was given instructions and the best wishes of the Chapter for the job ahead of him.

The party held at the Sigma Chi house Sunday, December 14, was well attended by actives, alumni and friends, and everyone had a great time. The often heard opinion was "Let's do it again real soon."

Plans are being made to start a new pledge class after the first of the year. Honorary members will be included.

There will be a special meeting of Gamma Beta Chapter on Friday, December 19, in Monroe 206, at 9:30 P.M. The regular January meeting will be held on the 14th, at which time prospective members will be pledged.

• At the December meeting of the A.I.E.E. Mr. Savage and Mr. Philliss of the Capitol Transit Company along with Dean Mason were guests.

Mr. Savage, formerly of the George Washington Faculty spoke on the present day trends in public transportation. He indicated that public transportation systems in congested areas are adding more and more diesel and gas units with a corresponding decrease in electric powered equipment due to the increased cost of electric energy.

The next meeting will be held January 7, 1952, when the A.I.E.E. joints the I.R.E. for a joint meeting. The speaker and subject will be announced at a later date.

• Members of IRE were treated to an unusually clear demonstration of the principles of a broadcast receiver by Mr. William W. Balwanz, electronic scientist at Naval Research Lab. The lecture was presented in the Communication Lab where an RCA dynamic demonstrator was available. Mr. Balwanz pointed out the simplicity of a receiver by illustrating that the receiver can be broken down to filters and amplifiers. The lecture was enjoyed by all.

At the regular business meeting it was decided to meet jointly with the AIEE on January 7, 1953. The speaker will be decided upon by members from both societies. This will insure a subject of mutual interest to all concerned.

• The December meeting of the Student Chapter of the American Society of Civil Engineers was highlighted by a speech given by Colonel Douglas H. Gilette, Corps of Engineers, U. S. Army. Colonel Gilette was the Assistant to the Executive Director of the Commission on the Renovation of the Executive Mansion. Last April, he spoke at the Eleventh Annual Student Chapter ASCE Conference held at George Washington

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"I needed to 'Find' Myself—that's why I picked Allis-Chalmers,"

says A. J. MESTIER
Massachusetts Institute of Technology Sc. B.—1943
and now Manager, Syracuse District Office

"I WAS LOOKING for an engineering job, but I wasn't very sure just what phase of this broad field would interest me most. I didn't know whether I wanted straight engineering, sales engineering, production or some other branch of industrial engineering.

"Allis-Chalmers Graduate Training Course gave me a means of working at various jobs—seeing what I liked best—and at the same time obtaining a tremendous amount of information about many industries in a very short time."

Experience Typical

"My experience is typical in many ways. I started the Graduate Training Course in 1946, after three years in the Army. My first request was to go to the *Texrope* V-belt drive department. From there I went to the Blower and Compressor department; then the Steam Turbine department. By the time the course was completed in 1948, my mind was made up and I knew I wanted sales work. I was then assigned to the New York District Office and in 1950 was made manager of the Syracuse District. The important thing to note is that all Allis-Chalmers GTC's follow this same program of picking the departments in which they want to work.

"Best of all, students have a wide choice, for A-C builds machines for every basic industry, such as: steam and hydraulic turbine generators, transformers, pumps, motors and other equipment for electric power; rotary kilns, crushers, grinders, coolers, screens and other machinery for mining, ore processing, cement and rock processing. Then there is flour milling machinery, electronic equipment and many others."

Taking surge voltage distribution tests on power transformer in A-C shops with miniature surge generator and cathode-ray oscilloscope.

A Growing Company

"In addition, new developments and the continuing growth of the company offer almost endless opportunities for young engineers.

"From my experience on the Graduate Training Course, I believe it is one of the best conducted in the industry and permits a young engineer to become familiar with a tremendous variety of equipment—both electrical and mechanical—which will serve him in good stead in his future profession."

Ball Mill grinds ore for large copper producer. Same type of equipment from Allis-Chalmers pulverizes much of nation's cement.

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS

For information call the Allis-Chalmers District Office in your locality or write to Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin

PRESTRESSED CONCRETE CONFERENCE

The first prestressed concrete building in the Washington area is now under construction in Arlington County, Virginia. A load test of a full-size beam from this building will be the highlight of the first Washington Regional Conference on Prestressed Concrete which is scheduled for Saturday, January 31, 1953.

This conference will be sponsored by The George Washington University Student Chapter of the American Society of Civil Engineers, with the cooperation of the District of Columbia Section of the A.S.C.E., Washington-Metropolitan Chapter of The American Institute of Architects, the Master Builders' Association, Inc., the Expanded Shale Institute, the Bureau of Yards and Docks, the Office of the Chief of Engineers, the Arlington County Department of Inspection Building Division, and various other technical and governmental organizations.

Meetings will be held in the Lisner Auditorium at 21st and H Streets, N.W., Washington, D. C. There will be plenty of free parking on the University Parking Lot at 23rd and H Streets, N.W.

The tentative program is:

8:00 a.m.-9:00 a.m.	Registration in Lisner Auditorium.
9:00 a.m.-1:00 p.m.	Series of papers dealing with various phases of prestressing. Topics will be: "What is Prestressed Concrete?" "How to Prestress Concrete" "Application of Prestressed Concrete to Bridges" "Application of Prestressed Concrete to Buildings"
2:30 p.m.	Test loading of beam. If possible, this will be carried out on the college campus; otherwise it will be at the job site.
6:00 p.m.	Dinner at New Colonial Hotel, 1156-15th St., N.W., with an address by a guest speaker. $3.50.
8:30 p.m.	Movies about prestressed concrete in Lisner Auditorium.

To cover the costs of the conference, a registration fee of $1.00 will be collected.

DR. GREENSHIELDS WRITES BOOK . . .

The Eno Foundation devoted to study and research for highway traffic and parking improvement is publishing a new book written by Bruce D. Greenshields, CE, PhD., Professor of Civil Engineering and Frank M. Weida, Ph.D., Professor of Statistics, both of George Washington University. The book is entitled "Statistics, with applications to Highway Traffic Analyses" and covers statistical theories and their application to the analysis of traffic data. The Eno Foundation says that "The writers have been guided by a practical insight and have shown an unusual and necessary discernment of the subject."

In some quarters, thinking on traffic as a national problem has reached a degree of desperation, due partly to confusion. This study by Greenshields and Weida may provide some clarification by emphasizing the importance of an analytical basis for initiating logical improvements. Mathematics learned by the engineer is of a classical type—algebra, trigonometry and calculus—in which exact answers are obtained. In statistics no answer is exact for there is always a range of variability within which the true answer lies. The variance may be so small that the result, for practical purposes, may be considered correct. In traffic behavior, a phase of human behavior, it is well to employ the "mathematics of human welfare."

"Statistics" is well written and easy to read and understand. The excellence of the work cannot be denied.

OMICRON DELTA KAPPA

The names of eight outstanding University men, tapped for membership in Omicron Delta Kappa, a national activities honorary fraternity, were announced at the Homecoming Dance. Among those honored was Mike Rapport, Electrical Engineering student.

COME TO THE ENGINEERS' BALL

The time is all too short before that gala occasion, one of the outstanding spring events in the University's social schedule, the Engineers' Ball, is upon us. Have you reserved the night of February 21 to take your favorite girl to this splendid affair?

Please turn to page 22

ALUMNEWS

Wake up alums. Lets hear from you. Last year your editor reaped a harvest of little news items from GW's Engineering Grads—some old-timers too. Some of you may have written some good technical articles. Don't be coy—send them in and let us print some of them. Don't forget, this is your magazine too—USE IT! We also want pictures, of you, of jobs you are working on or projects you have designed or built. Lets get together. This magazine can grow IF you will feed it. There are over 2,300 alums. **Just remember, if we don't get it we can't print it.**

Gerald L. Warner, B.E.E., 1950, is an electronic engineer with the Raytheon Mfg. Co. He is working in their missile and radar division at Watham, Massachusetts. Gerald indicates he intends to stay up in Yankee land awhile. He just bought a new home at 139 Maple Street, Lexington, Mass.

R. A. Wise, B.E.E., 1950, is now with Westinghouse Electric Co. He is now training in their creative engineering program.

Norris C. Hekimian, B.E.E., 1949, is with the National Bureau of Standards in the position of Radio Engineer. Norris is working in the NBS central radio propagation laboratory. He has been with the NBS ever since his graduation from G.W.U. plus the summer of 1948 when he worked as a Radio Technician.

I. C. Schoonover, A.B. in Chem., 1929, of the National Bureau of Standards and **A. F. Forziati** of the American Dental Association have developed a technique to reveal hitherto undetected details of tooth structure. The technique utilizes the natural fluorescence of human teeth. This technique is now being used at the NBS to study the mechanism of decay of human teeth.

Thomas G. Diggs, B.S.M.E., 1926, has recently completed a study of the effect of temperature on the tensile properties of high-purity steel at the National Bureau of Standards. Mr. Diggs found that in general the metal's yield and tensile strength, and also ductility at maximum load, tend to decrease with increase in temperature. The elongation at complete fracture attains a minimum at about 500°F.

Fred Battle, Jr., BCE '52, is now a Resident Engineer for the Civil Aeronautics Administration stationed at Hazeltine Electronics Corporation in Little Neck, New York. Fred is enrolled in the graduate school of the Brooklyn Polytechnic Institute taking one course at a time. His address is now 3993 Beechwood Place, Seaford, Long Island, New York. *Thanks for the two year subscription, Fred.*

Bill Wooldridge, BEE '52, and *Jim Simpson*, BEE '52, are working for General Electric at Pittsfield, Mass. Bill and Jim are at present engaged in writing an article entitled "The Transition from College to Industry" which we hope will appear in a later issue of this magazine. They miss G.W. and would like to hear from their friends. Bill's address is General Electric Co., Bldg. 51, Room 101, Pittsfield, Mass.

To: The Mecheleciv Magazine
Student Union Annex
The George Washington University
Washington, D. C.

Please find enclosed $1.00 for a subscription to the **Mecheleciv** Magazine (6 big issues).

Name ....

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City .... State ....

Degree and Year Graduated ....

(Editor's Note: Include information about yourself and pictures; also comments on the magazine.)

 (Continued from page 18)

CAREER CONFERENCE COMING UP

For the past two years the George Washington University has sponsored a conference for the purpose of advising graduating and near graduating students of job opportunities and careers in manufacturing firms, utilities corporations and governmental agencies. The conference is opened as a general assembly, keynoted by prominent speakers and music is furnished by a well-known band or orchestra. After the general assembly, the participants disperse into groups or minor assemblies representing the various fields of education: religion, engineering, journalism, etc.

Each year the engineers have stolen the show by featuring principle speakers on a prominence level with or above those invited to the general assembly. Also, the engineers have been allotted the use of the auditorium for their meeting since they usually present a professional, well-planned program.

This years conference, on February 18, 1953, will be better than ever. In order that the engineer portion of the program retain its reputation and high standards, the engineering student body must support the meeting with a large attendance.

12½% OF WHO'S WHO, ENGINEERS

Four engineers were elected to Who's Who in American Colleges and Universities for 1952; thirty-two students in all were elected from the university. These engineers who have earned reputations as Campus Leaders are Edward R. Caldwell, Harry Kriemelmeyer, Alfred B. Moe and Michael B. Rapport. This is the largest representation that the Engineering School has had in this outstanding event. The selectees earned their reputations through active support of the engineering fraternities and societies as well as participation on the Engineers Council and MECHELECIV MAGAZINE.

ONUFRAK RECEIVES ASCE AWARD

John J. Onufrak, CE, was presented with the student award of the District of Columbia Section of the American Society of Civil Engineers at the Society's annual meeting on November 11 at the Cosmos Club. The award, a certificate and check, is given each year to the outstanding civil engineering student at each of the District of Columbia's Universities, George Washington, Catholic, and Howard.

The requirements for selection are that the student must have completed his junior year and shall have followed a civil engineering curriculum. He must be considered a prospectively successful engineer, and must have been of service to the student chapter and active in extra-curricular activities. His selection is further based on scholarship, character and personality.

Johnny expects to graduate in June. He is presently employed full-time by the Army Corps of Engineers, Military Operations, and is a part-time student. His hobby is electronics and television, which he has studied at Pennsylvania State College Extension School, Drexel Institute of Technology, and the Philadelphia Signal Depot. Johnny is also an active member of Sigma Tau, engineering honorary fraternity.

Mofoto

CRASH! Concrete cylinder undergoing compression test caught at instant of failure in Concrete Laboratory, CE 149. The startled spectator in the background is Professor Walther of the C. E. Dept. (The photographer was startled too.)

HSIN WONG *(Continued from page 14)*

member of Sigma Tau since the spring of 1952. Due to his friendliness and cheerful disposition he is well liked by his fellow students and because of his skill in solving engineering problems he is quite popular among the EE students on the fourth floor of the Student Union.

He is now going to school on an educational visa under the direction of the State Department which pays his tuition and gives him a living allowance for eight months a year. The past two summers he has worked for the U.S. Government.

When he graduates from GWU, Hsin hopes to attend graduate school at either Massachusetts Institute of Technology, the University of California, the University of Michigan, or New York University.

TELEVISION *(Continued from page 12)*

Another application of television in the field of science is the television microscope. This consists of a small television camera mounted at the eyepiece of a conventional optical microscope. The image is carried over lines to a receiver where a group of scientists or students may watch it simultaneously, rather than each awaiting his turn. The advantages, however, go beyond this convenience. The human eye responds to light waves of approximately 4000 to 7000 Angstroms wavelength; i.e., the visible spectrum. Often the specimen does not show up clearly within this range, while it may at some wavelength invisible to humans. The target of the television camera is sensitive to incoming light waves from the scene televised because of its photoelectric properties. By properly choosing the photoelectric substance used, the camera may be made to respond to these "invisible" light waves, producing on the receiver screen a picture of something which could not be seen directly by the human eye. The increase in clarity and contrast in the picture of the specimen at the proper frequency as compared to the visible frequency range is sometimes striking.

There are great possibilities for the use of television outside of the broadcasting field. The examples cited show only a few of the many possibilities in education and research. The variety of applications is limited only by the ingenuity of the engineers, who must design the systems, and by their economic feasibility to those who will use them.

REFRIGERANTS *(Continued from page 13)*

peratures the system would be under a high vapor pressure. The designer must decide whether a system can contain the necessary refrigerant to produce the desired effect and withstand the high pressures produced at high temperatures. One solution to this problem is the installation of an auxiliary tank on the suction side of the system to allow the refrigerant to expand. With the insertion of an auxiliary tank care must be exercised in selecting the proper type of valving to prevent pockets of liquids throughout the system where high saturation pressures could be built up.

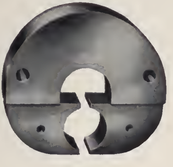
The use of these two Freon refrigerants will require thorough investigation and research as to the behavior of metals at low temperatures while under stress, lubrication of mechanical compressors, and the possible development of more efficient insulating materials.

What's Happening at CRUCIBLE

about permanent alnico magnets

automatic control—permanent magnets are partners in industrial progress

One important part of the "automatic" factory is the requirement that measuring devices be accurate, rugged . . . and because of their use in such great volume they have to be low cost. It is a credit to instrument manufacturers that these meter miracles are being accomplished. Not only are the meters more sensitive, lower cost . . . but specialized problems in measurement are solved everyday with new and different instruments.

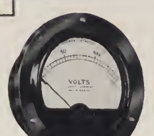


Former design of magnet assembly using Alnico II.

before

Note how redesigned magnet is made lighter because of reductions in area. The change from Alnico II to Alnico V with this design improved flux density.

after



Marion Meter, Model 53RN.

here's how Marion cut magnet costs 1/3 ...and built a better meter!

Marion Electrical Instrument Company, prominent meter manufacturer, embarked on a plan of redesigning their meters to give improved service. The Marion Meter, Model 53RN shown here, is a good example of what is being accomplished.

In redesigning their instruments, Marion worked closely with Crucible magnet specialists. The recommendation was made to change from Alnico II to Alnico V for the magnetic alloy used in the meter's D'Arsonval movement. Then the magnet itself was redesigned. The overall effect was to reduce the weight of the magnet by 35%, cut the cost ⅓ . . . and increase the gap flux density which resulted in a 15% increase in the torque of the movement. The illustration shows the old and new design.

This development is typical of how Crucible is working to increase measuring efficiency with permanent alnico magnets. Have you a magnet application we can cut costs on by ⅓?

magnet data book available

Since the advent of the alnico market in 1936, Crucible has pioneered in the design and development of special magnet alloys. Send for your copy of Crucible's "PERMANENT MAGNET DESIGN". This booklet points out design factors in the selection of alnico magnets. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, New York.

CRUCIBLE first name in special purpose steels

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National Drawn Works, East Liverpool, Ohio • Sanderson-Halcomb Works, Syracuse, N. Y. • Trent Tube Company, East Troy, Wisconsin

SOCIETIES *(Continued from page 16)*

University. Colonel Gilette was warmly welcomed by those who had met him last Spring and his speech on "Engineering Frontiers" was indeed inspiring and appropriate for all those who heard him on the evening of December 3rd.

The meeting on January 7th will feature a talk by Mr. Moses Freedman, G.W. alumnus and local construction engineer.

● Sigma Tau, the engineers honor fraternity, initiated sixteen student and two alumni members on Saturday afternoon, December 13, 1952.

The two alumni members that were initiated were Dr. Allen V. Astin, director of the National Bureau of Standards, and Mr. Charles H. Tompkins, prominent Washington builder.

The following students were honored: Warren L. Chestnutt; Paul O. Drury; William M. Galvin, Jr.; Robert E. Gardner; Richard A. Haefs; James G. Hiemenz; Edward V. Hobbs; Robert E. Miller; William E. Milto; Kenneth L. Park; Arthur E. Proctor; Brent M. Quinn; Darrell E. Rodgers; Paul E. Schmidt, Jr.; Milton A. Stovall; and Ralph F. Thompson.

ATTENTION ALL ENGINEERS

If you would like to work on the Mecheleciv, you are invited to attend the first organizational meeting of the year on Sunday, January 11, at 3:00 PM in Room 303 of the Student Union Annex.

For details call Mike Rapport, Tu. 2-3851, or Dick Caldwell, Ra.3-6967.

1 2 3 4 5 6 7 8